REMARKS

Claims 1-4, 13, 14, 16, 21, 57, and 69 are pending in the present patent application. The examiner has rejected claims 1-4, 13, 14,16, 21, 57, and 69. Applicant has amended claims 1 and 13. Applicant respectfully requests reconsideration of claims 1-4, 13, 14,16, 21, 57, and 69. in the view of at least following remarks.

The Examiner has rejected claims 1-4, 13, 14, 16, 21, 57, and 69 under 35 USC 102(e) as being anticipated by Chan et al. Applicant respectfully disagrees.

As is shown below, Chan describes a passive network that is incapable of providing the functionality or structure of the present invention. As amended, the independent claims are patentably distinct from the teachings of Chan for a number of reasons, not the least of which is that the present invention is directed to an active circuit as compared to the passive circuit of Chan. In addition, Chan could not present an infinite impedance without rendering the circuit of Chan inoperable.

Topologically, the Chan et al. networks use two of the classic structures for 2-port networks. The preferred embodiment is in the form of a Bridged Tee with resistor 44 constituting the bridge leg, resistors 42 and 46 constituting the 2 series legs of the Tee, and resonator 40 constituting the Tee leg of the structure. The alternate embodiment (not shown) would have a resistor for each series branch and the Tee leg would consist of a resistor in series with the resonator (or parallel L-C as an alternate). Thus, all frequency dependent elements are located in the Tee leg for both disclosed embodiments.

Per Chan et al., both topologies contain shunt branches formed by or containing a parallel L-C structure, whether in the form of a resonator or discrete L and C components. It is well known that the inclusion of a parallel L-C network in a shunt leg will place a complex pole in the transfer function (and a zero in the attenuation function) for the network. Thus, the Chan et al. circuits are all forms of passive, lossy, absorptive, band-pass filters. The center frequency of the pass-band and the bandwidth are determined by the equivalent L and C values of the parallel network (resonator or discrete) and their Q. The resonator is a means to realize very high Q values. As such a filter, both desired and undesired signals are treated in the same manner, their amplitude is reduced and their phase shifted based on the frequency components of the signals and the attenuation and phase shift characteristics of the network transfer function at those frequencies.

It also should be noted that both the resonator and the parallel L-C network store energy and take a finite time to "charge and discharge" and thereby reach their steady state operating conditions. For an input signal with changing amplitude, the Chan et al. networks will source or sink current to adjust their stored energy and operating point. As a result, except for very slow changes in input signal amplitude (drift), the Chan et al. networks cannot present infinite impedance in the Tee leg to the source signal during and for a potentially significant period after the amplitude changes. Thus, Chan et al. will only function on an essentially constant amplitude fixed frequency source signal.

The examiner has suggested that a passive, narrow band, absorptive filter that only works with a single, fixed amplitude and frequency source signal anticipates the electronic isolator of the present invention but Applicant respectfully disagrees.

In the rejection, the examiner claims that Chan et al. anticipates the claim for "configuring means for configuring the path to appear as an infinite impedance to the output signal from the source stage." Since the only paths present in the Chan disclosures into which noise could potentially be directed away from the source and load stages are the Tee legs, infinite impedance will only occur if the Q of the resonator or parallel L-C network is infinite. The feasibility and implications of this will be discussed in a subsequent section but it is helpful in understanding why Chan et al. does not anticipate the disclosed electronic isolator to first accept the examiner's inherent assumption of an infinite Q for the resonator or parallel L-C network in the Tee leg of the overall 2-Port.

In normal operation, the source signal (first mixer (20) modulated IF output) is in-band and charges the resonator such that the voltage approaches that of the input signal (steady-state AC), thus reducing the signal current in the shunt leg of the network. Ideally (with the shunt leg thus representing an infinite impedance), the 2-Port network, in-band, would appear as a series resistance whose value would be resistor 44 in parallel with the series combination of resistors 42 and 46. Outside the pass-band, the output voltage across the parallel L-C would remain essentially 0 (again steady-state AC) and the 2-port network would appear as a conventional PI or Tee attenuator.

In Chan et al., the output from the source stage (20) consists of both the desired source signal (in-band) and undesired noise and modulation products that can be both in-band and out-of-band. For the out-of-band portions (clearly present since this represents the primary reason Chan et al. included this coupling circuit (22) in their RF receiver), the Chan et al. coupling circuits appear as a resistor attenuator that has finite, not infinite input impedance. Therefore, the impedance of the Tee leg with respect the out-of-band source signals will not be infinite.

For in-band source signals where we are assuming that the resonator or parallel L-C network is providing infinite, Tee leg impedance, it is clear that this condition effectively removes the only paths into which noise (in-band) can be directed away from the source and load stages. As a result, in-band noise from the load stage is passed to the source stage and in-band noise generated or reflected by the source stage is passed to the load stage. The only impact is the small reduction in amplitude produced by the divider action between the equivalent in-band resistance of the 2-Port and the terminating resistance presented by the stage.

In the prior office action, it was suggested that the use of FETs in the off state result in the shunt path(s) (path(s) into which noise can be directed away from the source and load stages) presenting infinite impedance to the source signals. In our response, we pointed out that in so doing, infinite impedance was also presented to noise entering the output and there was effectively no path was left into which noise could be directed. In Chan et al., the same problem occurs. Either the disclosed circuit does not present infinite impedance to certain source signals or it removes the path into which noise might be directed under conditions where it presents the claimed infinite impedance. Like Barta with the FETs, Chan et al. cannot simultaneously provide both infinite impedance and a path into which noise may be directed.

The above discussion reflects the initial assumption that the resonator or parallel L-C network are ideal, a condition necessary to actually realize the infinite impedance suggested by the examiner. There are two problems associated with the actual realization of this condition by Chan et al. First, there are no ideal components and the "infinite impedance" must therefore be a boundary condition that can only be approximated or approached. Even an open circuit will have some stray parasitic capacitance and resistance to ground. In passive networks such as Chan et al., the conventional approach for physical implementation is to settle for a value that is "adequately large for the specific application". Thus a real world application might utilize a resonator with a Q range of a few hundred to a high of several hundred thousand (using crystals), not an infinite Q.

Another problem with Chan et al. achieving infinite impedance is a system limitation. In order for the network to actually realize the infinite impedance, the Q of the resonator would need to be infinite. However, as the Q increases, the bandwidth decreases so that at infinite Q, the bandwidth would be zero making it unusable in a communications system. In any such system, the Q may be limited by system design constraints as well as mere physical realizability.

The examiner has suggested that Chan et al. includes "...configuring means for configuring..." This appears to be a misapplication of the term "configuring means". Chan et al is a passive network with fixed values. Even the performance of the resonator is a function of its geometry and the properties of the materials from which it is made. The only configuring means appears to be the designer that selects the component values. As discussed above, Chan et al. is a 2-Port, band pass filter. By the examiner's definition, all filters would include configuring

means since they have transfer functions where attenuation and phase are functions of frequency. Applicant requests that the Examiner point out with specificity the configuring means.

As seen in the discussion of its operation above, Chan et al. is the functional equivalent of a series resistor within its pass-band. Its in-band insertion loss is therefore independent of which port a signal or noise enters. Even its out-of-band functional equivalent, a simple PI or Tee type resistor attenuator, lacks the non-reciprocal character and asymmetric insertion loss of an "isolator". Furthermore, Chan et al. does not discuss "isolators" (as opposed to isolation) at any point in his teaching. It is clear from this that Chan et al. does not anticipate or disclose "an electronic isolator (22) between a source stage (20) and a load stage (24)", and does not anticipate or disclose "an electronic isolator in which the insertion loss is inherently dependent on the direction of signal and noise transmission through the electronic isolator".

All dependent claims, being based on allowable independent claims, are themselves allowable.

CONCLUSION

For at least foregoing reasons, Applicant submits that the cited art does not teach or suggest, let alone anticipate, claims 1-4, 13, 14, 16, 21, 57, and 69 of the present application. In view of above, it is submitted that the claims now in the application, i.e., claims 1-4, 13, 14, 16, 21, 57, and 69 are in condition for allowance.

Respectfully submitted,

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